

Patent Claims

1. A combined sensor and heating element, in particular for the seat of a motor vehicle, comprising a sensor mat having a heating conductor system, characterized in that the sensor mat is implemented as a flexible printed conductor film, which includes a carrier film (2) and printed conductors (4) of a sensor system situated on the surface of the carrier film (2), and the heating conductors (3) of the heating conductor system are situated on the same carrier film surface (2) between and/or neighboring the printed conductors (4) of the sensor system.
2. The combined sensor and heating element as recited in Claim 1, characterized in that the sensor system includes seat-occupant detection sensors and/or temperature sensors.
3. The combined sensor and heating element as recited in Claim 1 or 2, characterized in that the heating conductor system may be switched and/or controlled using the seat-occupant detection sensors.
4. The combined sensor and heating element as recited in one of Claims 1 through 3, characterized in that the signal of the seat-occupant sensors is usable for airbag control.
5. The combined sensor and heating element as recited in one of Claims 1 through 4, characterized in that the sensor system and/or the seat-occupant detection sensors include pressure sensors.
6. The combined sensor and heating element as recited in Claim 5, characterized in that the pressure sensors include film switches.
7. The combined sensor and heating element as recited in one of Claims 1 through 6, characterized in that the printed conductors (3, 4) for the heating conductor system and the sensor system are made of the same material.

8. The combined sensor and heating element as recited in Claim 7, characterized in that the printed conductors (3, 4) for the heating conductor system and the sensor system are made of copper and/or conductive paste.
9. The combined sensor and heating element as recited in one of Claims 1 through 8, characterized in that the heating conductor system and the sensor system are covered by a protective layer (6).
10. The combined sensor and heating element as recited in Claim 9, characterized in that the protective layer (6) includes a plastic film and/or a nonwoven material layer.
11. The combined sensor and heating element as recited in one of Claims 1 through 10, characterized in that the carrier film (2) includes a flexible plastic film.
12. The combined sensor and heating element as recited in Claim 11, characterized in that the plastic film is made of PI (polyimide), PET (polyethylene terephthalate), or PEN (polyethylene naphthalate).
13. The combined sensor and heating element as recited in one of Claims 1 through 12, characterized in that the electrical terminals (6, 7) of the heating conductor and the sensor system are situated on the carrier film (2) in such a way that they are connectable to the same connection plug.
14. The combined sensor and heating element as recited in one of Claims 1 through 13, characterized in that the heating conductor system and the sensor system are connectable to shared analysis and power supply electronics.
15. The combined sensor and heating element as recited in one of Claims 1 through 14, characterized in that it includes wiring to the analysis and power supply electronics.

16. The combined sensor and heating element as recited in one of Claims 1 through 15, characterized in that diodes, switches, and/or electronic components are integrated.
17. The combined sensor and heating element as recited in one of Claims 1 through 16, characterized in that the sensor and heating element (1) is divided into zones which may be switched, controlled, or regulated independently of one another.
18. A vehicle seat comprising at least one combined sensor and heating element as recited in one of Claims 1 through 17.
19. The vehicle seat as recited in Claim 18, characterized in that heating zones which may be switched and controlled or regulated independently of one another are provided on the seat surface and/or the backrest of the vehicle seat.
20. The vehicle seat as recited in Claim 19, characterized in that the heating zones are tailored to the contour of a human body located on the seat.
21. A method for manufacturing a combined sensor and heating element as recited in one of Claims 1 through 20, characterized in that the printed conductor structure is at least partially applied using a conductive paste printing method.
22. A method for manufacturing a combined sensor and heating element as recited in one of Claims 1 through 21, characterized in that the printed conductor structure is at least partially applied using a process having the following process steps:
 - a) applying a coating made of the printed conductor material to a flexible carrier,

- b) applying an etch resist coating, in a pattern which corresponds to the desired conductor layout, to the coating made of printed conductor material,
 - c) etching away the printed conductor material in the uncoated areas, removing the etch resist coating.
23. The method as recited in Claim 21 or 22,
characterized in that the conductor layout includes the wiring of the combined sensor and heating element to the analysis and/or power supply electronics.
24. The method as recited in one of Claims 21 through 23,
characterized in that the printed conductor material is laminated onto the carrier.
25. The method as recited in one of Claims 22 through 24,
characterized in that copper is used as the printed conductor material.
26. The method as recited in one of Claims 22 through 25,
characterized in that the copper coating is cleaned and initially etched before the etch resist coating is applied.
27. The method as recited in one of Claims 22 through 26,
characterized in that the etch resist coating is printed on.
28. The method as recited in one of Claims 22 through 27,
characterized in that the etch resist is removed by flushing using an alkaline solution.
29. The method as recited in one of Claims 21 through 28,
characterized in that a protective layer is applied to the finished printed conductor structure.
30. The method as recited in Claim 29,
characterized in that the protective layer is laminated on.

31. The method as recited in Claim 29 or 30,
characterized in that a protective layer made of a plastic film and/or made of nonwoven material is applied.
32. The method as recited in one of Claims 21 through 31,
characterized in that a plastic film made of PI (polyimide), PET (polyethylene terephthalate), or PEN (polyethylene naphthalate) is used as the carrier film.